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REMARKS

By this Amendment, claims 1, 5, and 9 have been revised and claims 11 and 12 have been added to place this application in condition for allowance. Currently, claims 1-12 are before the Examiner for consideration on their merits.

In review, claims 1-4, 6-8, and 10 are rejected under 35 U.S.C. § 103(a) based on United States Patent No. 4,871,194 to Kawashima when taken in view of the Bestolife article (Bestolife). More particularly, the Examiner admits that Kawashima does not teach the use of a lubricant that lacks any heavy metals as part of the threaded joint. The Examiner concludes that it would be obvious to use the non-metal lubricant of Bestolife in the joint of Kawashima. The motivation for doing so is that environmental concerns would drive the artisan to use the environmentally-friendly lubricant of Bestolife in the thread joint of Kawashima.

Applicants respectfully traverse the rejection on the grounds that the use of the claimed lubricant in a threaded joint in steel pipes produces unexpected results in a high temperature environment. Claim 1 has been amended to clarify that the threaded joint is used in a high temperature environment. Support for this revision can be found in the specification, see for example, page 3, lines 23-25, and page 3, line 30 to page 4, line 4.

The improvements in high temperature performance of the threaded joint can be seen beginning on page 13, line 12. To backtrack though, the invention is aimed at solving the problems of drilling for crude oil in high temperature environments. Applicants realized that the prior art threaded joints that used compound greases or solid lubricants were ineffective for solving the recurrent problems caused by high temperature drilling environments.

More particularly, the compound greases used in the prior art contained lead or

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other heavy metals. These heavy metals were vital to the performance of the threaded joint because the lead that was present between the contacting thread surfaces avoided a metal (steel) to metal (steel) direct contact so as to improve seizing resistance. While the lead presented an environmental problem, a lubricating agent was not known to the inventors that provided adequate seizing resistance in high temperature environments.

Turning again to the invention, the arguments for patentability are addressed below by claim heading.

Claim 1

Claim 1 not only defines the presence of lubricating layer, but also limitations regarding the porosity and thickness of the undercoating layer and overall thickness of the undercoating layer and lubricating coating layer. Referring now to the specification beginning on page 13, line 12, a study was done to compare various threaded joints with comparative joints that did not include one or more features of the claimed invention. By practicing the invention, improved seizing resistance is obtained at temperatures of 250 °C for 100 hours.

There is no recognition of the effect of seizing resistance at elevated temperatures in the teachings of Bestolife. In fact, it is unclear as to the composition of Bestolife other than it is a lithium-based grease that is a blend of non-metallic materials. One of skill in the art derives no insight as to the importance or performance of the threaded joint at high temperatures, and the improvements in seizing resistance at elevated temperatures are quite surprising. These results effectively rebut any *prima facie* case of obviousness based on Kawashima and Bestolife, and claim 1 is patentable over the applied references for this reason alone.

It is also contended that neither Bestolife nor Kawashima address the

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importance of the overall thickness of the two layers. While the Examiner contends that the overall thickness claim limitation is met, there is no mention of a thickness of the combined grease and metallic undercoating in Kawashima. In addition, comparative example 18 shows that this thickness is critical. When the thickness exceeded 100 microns, the performance of the threaded joint was inferior in terms of seizing resistance. This criticality is further substantiation of the unexpected improvements in seizing resistance which are not within the realm of Kawashima and/or Bestolife.

Therefore, the rejection as applied to claim 1 should be withdrawn.

Claims 5 and 9

Claims 5 and 9 are also separately patentable over the applied references. These claims now recite a markush grouping for the organic acid of the lubricant. Support for this amendment can be found on page 10, lines 4 and 5 of the specification. These organic salts define the lubricating composition, and there is no suggestion in Kawashima, Bestolife or Brooks of such a composition. As stated above, Bestolife, to the extent understood, is a lithium-based grease. Brooks teaches the use of organic acids with mineral oil and Brooks is not even properly combined with Bestolife and Kawashima. In the rejection, the Examiner contends that it would be obvious to use the organic salts of Brooks with the lubricant of Bestolife. At best, this assertion is hindsight. Bestolife is not the same or even a similar kind of lubricant as taught by Brooks. In fact, Bestolife is a proprietary lubricant whose composition is kept a trade secret. Thus, why would one of skill in the art seek to modify a composition that is unknown by employing the teachings of Brooks which relates to a different type of lubricating composition? There is no reason to do so, and the rejection of claims 5 and 9 based on Brooks is flawed and must be withdrawn.

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It is further argued that Brooks teaches a lubricant for an engine and auxiliary equipment, and there is no suggestion of its use in the field of threaded joints for steel drilling pipes. Again, there is no reason why one of skill in the art would look to the teachings of Brooks to modify Kawashima, alone or with Bestolife. Thus, the rejection as applied to claims 5 and 9 is flawed and must be withdrawn.

Claims 6 and 10

In the rejection of these claims, the Examiner refers to column 21 to support the allegation that a binder in the solid lubricant coating is organic or inorganic. The rejection is not understood since there is no column 21 in either Kawashima or Bestolife, and therefore, there is no legitimate basis to reject claim 6. Furthermore, the rejection alleges that it would be obvious to use the liquid lubricant of Bestolife in substitution for the grease of Kawashima, and this rejection fails to address the feature of claim 6 and its use of a solid lubricant. It is noted in the previous rejection that col. 21 of Tsuru was relied to reject claims 6 and 10. However, since the current rejection is not based on Tsuru, its teachings are not relevant to the issue at hand.

Claim 11

Claim 11 is also patentable over the combination of Kawashima and Bestolife on the grounds that the discovery that the threaded joint can be used in high temperature environments and still exhibit improved seizing resistance is one that is totally unexpected, and any contention of obviousness is effectively rebutted by this discovery. Again, there is no hint in Bestolife that the use of the Bestolife lubricant would result in improvements in seizing resistance at elevated temperatures. Table 2 of the specification shows these results and demonstrates that the results are surprising. The comparative examples further evidence that improvements in seizing resistance are realized when the threaded joint of the invention is used under high

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temperature and employs the various limitations regarding overall thickness of the two coatings, porosity and metallic undercoating thickness. This improvement in seizing resistance demonstrates that claim 11 is patentable over the applied prior art.

Claim 12

It is also asserted that claim 12 is separately patentable over the applied prior art. At most, Kawashima discloses impregnating the porous layer with a compound grease. Moreover, there is no disclosure in the examples of Kawashima of a separate thickness layer of the compound grease. Applicants contend that Kawashima does not teach a separate thickness of the lubricating coating layer. Referring to Table 2 of the specification, it is clear that the lubricating coating layer has its own thickness, the total thickness of the two layers being less than 100 microns. While the Examiner alleges that the "less than 100 μm " overall thickness is taught in Kawashima-Bestolife, there does not appear to be an explicit disclosure of this upper limit. At best, the Examiner can only surmise that since the compound grease is impregnated into the pores of the metallic undercoating layer, which has a maximum thickness of 30 microns, the total thickness is less than 100 microns. While this is arguably true if one does not require the lubricating coating to have a thickness, claim 12 defines a separate thickness for the lubricating coating, and this feature is lacking in Kawashima, even if modified with the Bestolife grease. Therefore, claim 12 is also distinguishable from the applied prior art.

In summary, it is respectfully submitted that claims 1, 5, 6, and 9-12 are not obvious under 35 USC §103(a) and the combination of Kawashima and Bestolife and Brooks. As stated above, the evidence in the specification rebuts the contention that it would be obvious to use the grease of Bestolife as part of the threaded joint of Kawashima. Moreover, a *prima facie* case of obviousness is not even established

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against claims 5, 6, and 9-12 since there is no reason to include the features found in these claims into the threaded joint of Kawashima.

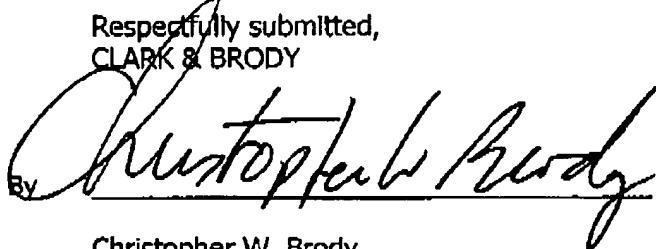
Accordingly, the Examiner is respectfully requested to examine this application in light of this amendment and pass claims 1-12 onto issue.

If an interview would expedite allowance of this application, the Examiner is invited to telephone the undersigned at 202-835-1753.

The above constitutes a complete response to the Office Action of March 2, 2005.

Again, reconsideration and allowance of this application is respectfully solicited. Please charge any fee deficiency or credit any overpayment to Deposit Account No. 50-1088.

Respectfully submitted,
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Date: June 2, 2005